

**WHAT IS CLAIMED IS:**

1. A telecommunication apparatus comprising:

a multi-stage surge protector and isolation barrier (14) connectable to a telephone network (12); and

a telephony device (10) in communication with said multi-stage surge protector and isolation barrier (14).

2. The telecommunication apparatus of claim 1, wherein said multi-stage surge protector and isolation barrier (14) comprises:

a first stage (16) operative to limit an output voltage to a predefined level;  
and

a second stage (18) operative to dissipate a transient from said first stage (16).

3. The telecommunication apparatus of claim 2, wherein said first stage (16) comprises spark gap circuitry (25) connectable to the telephone network (12).

4. The telecommunication apparatus of claim 3, wherein said spark gap circuitry (25) comprises:

a primary spark gap (26) coupled between a tip line and a ring line of the telephone network (12);

a first secondary spark gap (32) coupled to the tip line and ground; and

a second secondary spark gap (34) coupled to the ring line and ground.

5. The telecommunication apparatus of claim 4, wherein said first stage (16) further comprises:

a first current limiting resistor (22) coupled in series with the tip line and one side of said primary spark gap (26); and

a second current limiting resistor (24) coupled in series with the ring line and another side of said primary spark gap (26).

6. The telecommunication apparatus of claim 2, wherein said second stage (18) comprises LC circuitry (42) in communication with said telephony device (10).

7. The telecommunication apparatus of claim 6, wherein said LC circuitry (43) comprises:

a first LC filter (44) connected to one output of said first stage (16) corresponding to a tip line of the telephone network (12); and

a second LC filter (46) connected to another output of said first stage (16) corresponding to a ring line of the telephone network (12).

8. The telecommunication apparatus of claim 7, wherein:

said first LC filter (44) comprises:

a first inductor (48) in series with the one output of said first stage (16) corresponding to the tip line and a first LC filter output; and

a first capacitor (50) coupled between the first LC filter output and ground; and

said second LC filter (46) comprises:

a second inductor (52) in series with the other output of said first stage (16) corresponding to the ring line and a second LC filter output; and

a second capacitor (54) coupled between the other output of said second LC filter output and ground.

9. A surge protector/isolation barrier for a telephony device comprising:

first stage circuitry (16) connectable to a telephone network (12) and operative to clamp an incoming voltage to a pre-determined level; and

second stage circuitry (18) in communication with said first stage circuitry (16) and operative to filter a transient produced by said first stage circuitry (16), said second stage circuitry (18) connectable to a telephony device (10).

10. The surge protector/isolation barrier of claim 9, wherein:

said first stage circuitry (16) comprises spark gap circuitry (25); and

said second stage circuitry (18) comprises LC circuitry (43).

11. The surge protector/isolation barrier of claim 10, wherein said spark gap circuitry (25) comprises:

a primary spark gap (26) coupled between a tip line and a ring line of the telephone network (12);

a first secondary spark gap (32) coupled to the tip line and ground; and

a second secondary spark gap (34) coupled to the ring line and ground.

12. The surge protector/isolation barrier of claim 11, wherein said spark gap circuitry (25) further comprises:

a first current limiting resistor (22) coupled in series with the tip line and one side of said primary spark gap (26); and

a second current limiting resistor (24) coupled in series with the ring line and another side of said primary spark gap (26).

13. The surge protector/isolation barrier of claim 10, wherein said LC circuitry (43) comprises:

a first LC filter (44) connected to one output of said spark gap circuitry (25) corresponding to a tip line of the telephone network (12); and

a second LC filter (46) connected to another output of said spark gap circuitry (25) corresponding to a ring line of the telephone network (12).

14. The surge protector/isolation barrier of claim 13, wherein:

said first LC filter (44) comprises:

a first inductor (48) in series with the one output of said spark gap circuitry (25) corresponding to the tip line and a first LC filter output; and

a first capacitor (50) coupled between the first LC filter output and ground; and

said second LC filter (46) comprises:

a second inductor (52) in series with the other output of said spark gap circuitry (25) corresponding to the ring line and a second LC filter output; and

a second capacitor (54) coupled between the second LC filter output and ground.

15. A surge protector for a telephony device (10) that is connectable to a telephone network (12), the surge protector comprising:

means for clamping a voltage incoming from a telephone network to a predefined level (16); and

means, coupled to said means for clamping a voltage incoming from a telephone network to a predefined level, for dissipating a transient event associated with said means for clamping a voltage incoming from a telephone network to a predefined level (18), said means for dissipating (18) connectable to a telephony device (10).

16. The surge protector of claim 15, wherein said means for clamping a voltage incoming from a telephone network to a predefined level (16) comprises spark gap circuitry (25).

17. The surge protector of claim 16, wherein said spark gap circuitry (25) comprises:

a primary spark gap (26) coupled between a tip line and a ring line of the telephone network (12);

a first secondary spark gap (32) coupled to the tip line and ground; and

a second secondary spark gap (34) coupled to the ring line and ground.

18. The surge protector of claim 15, wherein said means for dissipating a transient event associated with said means for clamping a voltage incoming from a telephone network to a predefined level (18) comprises means for filtering the transient event (43).

19. The surge protector of claim 18, wherein said means for filtering the transient event (43) comprises:

a first LC filter (44) connected to one output of said means for clamping a voltage incoming from a telephone network to a predefined level corresponding to a tip line of the telephone network (16); and

a second LC filter (46) connected to another output of said means for clamping a voltage incoming from a telephone network to a predefined level corresponding to a ring line of the telephone network (16).

20. The surge protector of claim 19, wherein:

said first LC filter (44) comprises:

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a first inductor (48) in series with the one output of said means for clamping a voltage incoming from a telephone network to a predefined level corresponding to the tip line (16) and a first LC filter output; and

a first capacitor (50) coupled between the first LC filter output and ground; and

said second LC filter (46) comprises:

a second inductor (52) in series with the other output of said means for clamping a voltage incoming from a telephone network to a predefined level corresponding to the ring line (16) and a second LC filter output; and

a second capacitor (54) coupled between the second LC filter output and ground.